Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
Waiver of Part 25 Licensing Requirement for	)	IB Docket No. 17-16
Receive-Only Earth Stations Operating with the	)	
Galileo Radionavigation-Satellite Service	)	

REPLY COMMENTS OF TRIMBLE INC. AND DEERE & COMPANY

Trimble Inc. ("Trimble") and Deere & Company ("Deere," and together with Trimble, the "Joint Commenters") submit these reply comments in the above-referenced proceeding in which the Commission solicited comment on the European Commission's ("EC") request for waiver of the Part 25 licensing requirements for receive-only earth stations operating with the Galileo Radionavigation-Satellite Service.[1/] The initial comments demonstrate near-unanimous support for Commission grant of the authority required to permit U.S. devices to receive Galileo signals. The Commission should reject the comments that express concerns of interference to adjacent band services based on the EC's representations and the nearly 11-year history of interference-free Galileo operations.

I. COMMENTERS STRONGLY SUPPORT GRANT OF THE WAIVER

A. Permitting Access to Galileo's GNSS Signals Will Augment GPS Services.

The Joint Commenters asserted that the Commission should grant the waiver request because access to Galileo's Global Navigation Satellite System ("GNSS") signals will strengthen Global Positioning System ("GPS") service availability in the U.S., given the similarities

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1/ *FCC Seeks Comment on Waiver of Part 25 Licensing Requirement for Receive-Only Earth Stations Operating with the Galileo Radionavigation-Satellite Service*, Public Notice, IB Docket No. 17-16, DA 17-18 (rel. Jan. 6, 2017).

between GPS and Galileo.[2/] The European Commission agreed, noting, "[t]he Galileo signals were designed to be fully interoperable with the next generation of GPS signals and fully compatible with the current generation GPS C/A and P(Y) code signals."[3/] It further observed that "Galileo has the advantage of being the only other [radio navigation satellite service ("RNSS")] system that is fully compatible and interoperable with GPS, meaning that in the future, user receivers will be able to combine Galileo and GPS satellite signals almost as if they were from the same system."[4/]

Parties also agreed with the Joint Commenters that the performance of GPS will, in fact, improve when the signals from both GPS and Galileo are co-processed together.[5/] Hexagon Positioning Intelligence pointed out that because GPS and Galileo systems are similar and complementary, coordinating Galileo signals with GPS signals "will improve the resiliency of GPS in a number of ways."[6/] Airbus correctly noted that "a GPS + Galileo service will provide better performance than a GPS-only system while not providing any disadvantage."[7/] Similarly, Broadcom stated that it "strongly believes that a combined GPS + Galileo system will

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2/ Comments of Trimble Inc. and Deere & Company at 7-9, IB Docket No. 17-16 (filed Feb. 21, 2017).

3/ Comments of the European Commission at 3, IB Docket No. 17-16 (filed Feb. 21, 2017).

4/ Comments of the European Commission at 4; *see* Comments of Topcon Positioning Systems, Inc. at 1, IB Docket No. 17-16 (filed Feb. 21, 2017) ("Granting the requested waiver will accelerate access to the Galileo RNSS system in the United States and promote interoperability and compatibility.").

5/ Comments of Trimble Inc. and Deere & Company at 4; *see* Comments of Broadcom Corporation at 1, IB Docket 17-16 (filed Feb. 20, 2017) ("[T]he addition of Galileo [to GPS signals] potentially provides a large performance advantage.").

6/ Comments of Hexagon Positioning Intelligence at 4, IB 17-16 (filed Feb. 17, 2017).

7/ Comments of Airbus Defense and Space Inc. at 1-2, IB 17-16 (filed Feb. 21, 2017); *see also* Comments of Topcon Positioning Systems, Inc. at 2 ("Topcon believes that Galileo can serve as a complement to existing GPS by allowing devices to use both services in a coordinated fashion, an opportunity that offers particular advantages for high-precision devices.").

outperform a GPS-only system while not suffering any degradation as a result of the addition of Galileo in receiver designs."[8/]

B. Access to Galileo Will Strengthen PNT Services.

Commenters also noted that grant of the waiver will "improve the reliability, availability, and resiliency of [Positioning, Navigation, and Timing ("PNT")] services in the U.S.,"[9/] making GPS more accurate and dependable for its users. They recognized that the accuracy and dependability of PNT solutions will be strengthened if GPS is supplemented with Galileo signals because satellite visibility will increase, which will reduce system blockage. Airbus noted that grant of the waiver request will "increase[] [the] number of GNSS satellites in visibility and therefore the possibility to get a high quality fix as well as . . . increase[] system availability in challenging situations and environments."[10/] CNH Industrial stated that "[a]n increased number of usable signals will increase the availability of positioning information during conditions of partial sky blockages."[11/]

The Joint Commenters pointed out that grant of the waiver request will also enhance the accuracy and dependability of PNT solutions because Galileo could provide back-up capabilities for GPS.[12/] The European Commission agreed, pointing out that with Galileo, "users can get the assurance that their GPS position, navigation and timing fixes can be effectively backed up by

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8/ Comments of Broadcom Corporation at 4.

9/ Comments of QUALCOMM Incorporated at 1.

10/ Comments of Airbus Defense and Space, Inc. at 1; *see* Comments of Hexagon Positioning Intelligence at 4 ("Reception of Galileo signals will improve the availability of PNT solutions, particularly for operating environments with obstructions that block the view of the sky, which happens whenever travelling down a city street, following a wall or building, travelling on the lower deck of a bridge, passing under trees or following a tree row, and many other examples commonly encountered in daily life and industrial settings.").

11/ Comments of CNH Industrial N.V. at 1, IB 17-16 (filed Feb. 20, 2017).

12/ Comments of Trimble Inc. and Deere & Company at 12.

other RNSS systems," and because Galileo "often us[es] frequencies different from GPS, position, navigation and timing can be even more reliable, accurate and resilient."[13/] Topcon concurred that supplementing GPS services with Galileo will "improve[] the availability, reliability, and resiliency of space-based PNT services."[14/]

The Joint Commenters noted that back-up capabilities are especially important in the provision of location data to first responders and emergency services.[15/] Commenters agreed. The National Emergency Number Association ("NENA") noted, "[g]ranting the EC's waiver request will provide a new tool that handset manufacturers can use to help reliably locate their customers in an emergency."[16/] Further, NENA explained that Galileo can strengthen GPS's capability of providing location data because "multiple systems . . . can prove vital in resolving position ambiguities or detecting error conditions in the primary system."[17/] Similarly, the European Global Navigation Satellite Systems Agency ("European GSA") agreed that the benefits with respect to location information that will be conferred by granting the Galileo waiver request will be "particularly noticeable in emergency situations where a quick reaction into the right location can be a difference between life and death."[18/]

13/ Comments of the European Commission at 4; *see* Comments of Hexagon Positioning Intelligence at 4 ("Having more satellites providing signals that a receiver is capable of receiving greatly increases the number of epochs with a PNT solution of all precision levels, from centimeter to meter level positioning.").

14/ Comments of Topcon Positioning Systems, Inc. at 2. As the Joint Commenters noted, the U.S. Space-Based PNT Policy encourages the U.S. to "'improve and maintain . . . backup capabilities to meet growing national, homeland, and economic security requirements, for civil requirements, and to meet commercial and scientific demands' of its PNT system." Comments of Trimble Inc. and Deere & Company at 11-12.

15/ Comments of Trimble Inc. and Deere & Company at 4-5.

16/ Comments of the National Emergency Number Association at 1, IB 17-16 (filed Feb. 21, 2017).

17/ *Id.*

18/ Comments of European Global Navigation Satellite Systems Agency at 5, IB 17-16 (filed Feb. 21, 2017); *see also* Comments of Broadcom at 4 ("Including Galileo support in the GNSS receiver provides additional spatial diversity to the GPS constellation, providing greater opportunity to get a high-

II. THE COMMENTS ADEQUATELY ADDRESS INTERFERENCE ISSUES

Ligado and Inmarsat raise issues relative to potential interference to operations in the L-band.[19/] In particular, Inmarsat and Ligado state that the description of the E1 signal that the Galileo constellation would transmit is "incomplete,"[20/] and Ligado asserts that the Galileo signals will transmit outside the RNSS band.[21/] However, the comments of the EC make it clear that there is no basis for this concern. The EC clarified that the E1 signal will occupy a bandwidth of 32 megahertz between 1559-1591 MHz, less than the 51 megahertz in the RNSS band.[22/] The EC also noted that Galileo has transmitted in the 1559-1591 MHz band since 2006 without reports of interference to systems operating below 1559 MHz.[23/] Galileo signals will not change as a result of Commission grant of the requested waiver. Moreover, as the EU comments made clear, the Galileo system operates in accordance with rules developed by the International Telecommunications Union ("ITU") utilizing the RNSS allocation.[24/] Given these considerations, Ligado and Inmarsat have provided no support for the suggestion that technical evaluation of GNSS receivers that will receive Galileo signals should be pursued as part of this waiver proceeding.[25/]

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quality fix and increases the ability to get a fix under challenging conditions. In the case of 911 services these factors can have life or death consequences.").

19/ Comments of Ligado Networks LLC at 4-5, IB 17-16 (filed Feb. 21, 2017); Comments of Inmarsat Inc. at 2-3, IB 17-16 (filed Feb. 21, 2017).

20/ Comments of Ligado Networks LLC at 4; Comments of Inmarsat Inc. at 3.

21/ Comments of Ligado Networks LLC at 4.

22/ Comments of the European Commission at 1. If there are any remaining discrepancies between the public information covering Galileo operations, the Joint Commenters assume that those discrepancies can be easily resolved through an inquiry to the EC.

23/ *Id.*

24/ *Id.* 1-2.

25/ Comments of Ligado Networks LLC at 4.

III. CONCLUSION

Allowing reception of Galileo signals will advance public interest benefits. The Commission should promptly grant the EC's request for waiver.

Respectfully submitted,

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March 23, 2017